



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Persson *et al.*

Serial No.: 10/720,492

**Patent Pending**

Filed: November 24, 2003

Group Art Unit: 2631

For: Method and Apparatus for DS-CDMA  
Interference Suppression Using Code-Specific  
Combining

Confirmation No.: 4554

MAIL STOP DD  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA. 22313-1450

Sir:

**INFORMATION DISCLOSURE STATEMENT**

In accordance with 37 C.F.R. 1.56, counsel wishes to make of record the attached items of information for the Examiner's consideration in connection with this application. This IDS is submitted before the first Office Action, and thus no fee should be due. Also enclosed is a form PTO-1449 for the Examiner's convenience in making such consideration of record. Inclusion herein of any particular item of information is not to be construed as an admission that same is prior art.

**The Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account 18-1167.**

Respectfully submitted,

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Date: March 5, 2004  
File No.: 4015-5133

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Kathleen Koppen


**FORM PTO-1449**
**INFORMATION DISCLOSURE CITATION  
IN AN APPLICATION PURSUANT TO  
37 CFR §1.97 & 1.98**

Docket Number: 4015-5133	Serial Number: 10/720,492
Applicant: Fulghum et al.	
Filing Date: 11/24/03	Group:

**U. S. PATENT DOCUMENTS**

Examiner Initial	Patent No.	Date	Name	Class	Subcl	Filing Date If Approp.
	A 6,363,104	2002	Bottomley			
	B 6,026,115	2000	Higashi et al.			
	C 5,983,105	1999	Stahle			
	D 5,757,791	1998	Kanterakis et al.			
	E 5,506,861	1996	Bottomley			

**FOREIGN PATENT DOCUMENTS**

Patent No.	Date	Name	Class	Subcl	Translation Yes No
WO 00/72459	2000	Aazhang, Behnaam			

**OTHER DOCUMENTS** (including author, title, date, pages, etc.)

A	Pub. No.: US 2002/0122470 A1, Pub. Date: Sep. 5, 2002, "Method and Apparatus for Providing Blink Adaptive Estimation and Reception," Heikkila.
B	D.M. Novaković and M. L. Dukić, "Multistage multiuser detector for DS-CDMA multipath fading channel," <i>Electronics Letters</i> , vol. 34, no. 11, 28 May 1998, pp. 1068-1070.
C	Z. Xie, R.T. Short, and C.K. Rushforth, "A family of suboptimum detectors for coherent multiuser communications," <i>IEEE J. Sel. Areas Commun.</i> , vol. 8, pp. 683-690, May 1990.
D	S. Tantikovit, A.U.H. Sheikh and M.Z. Wang, "Combining schemes in rake receiver for low spreading factor long-code WCDMA systems," <i>Electronic Letters</i> , vol. 36, no. 22, 26 Oct. 2000, pp. 1872-1874.
E	S. Tantikovit and M.Z. Wang, "An optimum combining and concatenated-RAKE for dual-antenna mobile terminals in UMTS," <i>IEEE Commun. Letters</i> , vol. 6, pp. 231-233, June 2002.
F	C.B. Papadias and H. Huang, "Linear space-time multiuser detection for multipath channels," <i>IEEE J. Sel. Areas Commun.</i> , vol. 19, pp. 254-265, Feb. 2001.
G	A. Klein, G.K. Kaleh, and P.W. Baier, "Zero forcing and minimum mean-square-error equalization for multiuser detection in code-division multiple-access channels," <i>IEEE Trans. Veh. Technol.</i> , vol. 45, pp. 276-287, May 1996.
H	X. Wang and H.V. Poor, "Space-time multiuser detection in multipath CDMA channels," <i>IEEE Trans. Sig. Proc.</i> , vol. 47, pp. 2356-2374, Sept. 1999.
I	M. Juntti, "Performance analysis of linear multisensor multiuser receivers for CDMA in fading channels," <i>IEEE J. Sel Area Commun.</i> vol. 18, pp. 1221-1229, July 2000.

		"Extended MMSE receiver for multisuer interference rejection in multipath DS-CDMA channels," in <i>Proc. IEEE Veh. Technol. Conf.</i> , Amsterdam, The Netherlands, Sept. 19-22, 1999, pp. 1840-1844.
	K	W. L. Myrick, S. Sud, J.S. Goldstein, and M.D. Zoltowski, "MMSE correlator based RAKE receiver for DS-CDMA," in <i>Proc. Milcom 2001</i> , pp. 1418-1422.
	L	S.S.H. Wijayasuriya, J.P. McGeehan, and G.H. Norton, "Rake decorrelating receiver for DS-CDMA mobile radio networks," <i>Electronics Letters</i> , vol. 29, no. 4, pp. 395-396, 18 February 1993.
	M	S.S.H. Wijayasuriya, J.P. McGeehan, and G.H. Norton, "Rake decorrelation as an alternative to rapid power control in DS-CDMA mobile radio," 43rd IEEE Vehicular Technology Conf., Secaucus, NJ, pp. 368-371, May 18-20, 1993.
	N	G. Bottomley, T. Ottoson, and Y.-P. E. Wang, "A generalized RAKE receiver for interference suppression," <i>IEEE J. Sel. Areas Commun.</i> , vol. 18, pp. 1536-1545, August, 2000.
	O	M. Juntti, and B. Aazhang, "Finite memory-length linear multiuser detection for asynchronous CDMA communications," <i>IEEE Trans. Commun.</i> , vol. 45, pp. 611-622, May 1992.
	P	Deng et al., "A Multistage Multi-Carrier CDMA Receiver with Enhanced Interference Suppression," 3rd IEEE Signal Processing Workshop on Signal Processing Advances in Wireless Communications, Taiwan, March 20-23, 2001.
	Q	Sukvasant et al., "A new RAKE receiver structure for the forward-link of W-CDMA systems," <i>IEICE Transactions on Communications</i> , vol. E85-B, no. 6, pp. 1218-22, June 2002, ISSN 0916-8516.
	R	D.M. Novaković and M.L. Dukić, "Multistage multiuser detector for multipath fading channel," <i>European Transactions on Telecommunications</i> , vol. 12, no. 6, pp. 471-8, Nov-Dec 2001, ISSN 1120-3862.
	S	Irfan Ghauri and Kirk T.M. Slock, "Linear Receivers for the DS-CDMA Downlink Exploiting Orthogonality of Spreading Sequences," <i>Proc. 32nd Asilomar Conf. on Signals, Systems 8c Computers</i> , Pacific Grove, CA, Nov. 1998.
	T	H. Hadinejad-Mahram and G. Alirezai, "A Linear Receiver for WCDMA Downlink Exploiting the Coloration of the Interference," 0-7803-7661-7/03/\$17.00©2003 IEEE
	U	H. Huang and S. Schwartz, "A Comparative Analysis of Linear Multiuser Detectors for Fading Multipath Channels," presented at Globecom '94 conference, 1994 IEEE, pp. 11-15.
	V	S. Tantikovit and A. U. H. Sheikh, "Joint Multipath Diversity Combining and MLSE Equalization (Rake-MLSE Receiver) for WCDMA Systems," presented at VTC2000, 2000 IEEE, pp. 435-439.
	W	J.G. Proakis, <i>Digital Communications</i> , 2nd edition, section 7.5.
	X	E. Dahlman and M. Sawahashi, "13.3G Evolution and Future-Generation Air Interface in Mobile Communications"

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation not in conformance and not considered. Include copy of this form with next communication to the applicant.